

Digitized by the Internet Archive
in 2011 with funding from
University of Toronto

<http://www.archive.org/details/notesonoccurrenc00russ>

LIBRARY
ROYAL ONTARIO



CONTRIBUTIONS OF THE
ROYAL ONTARIO MUSEUM OF PALAEONTOLOGY

NO. 2: NOTES ON THE OCCURENCE OF FOSSIL
FISHES IN THE UPPER DEVONIAN OF
MAGUASHA, QUEBEC

BY Loris S. Russell

DECEMBER, 1939

NOTES ON THE OCCURRENCE OF FOSSIL FISHES IN THE UPPER
DEVONIAN OF MICHIGAN, 1911

By LEO S. BEAN
Assistant Director of Vertebrate Paleontology

During the field season of 1911 the Royal Ontario
Museum of Paleontology sent a collecting expedition
to the Paleozoic Fish localities of Canada and New
Brunswick. The party consisted of the writer and Mrs.
Knox, and Mr. L. S. Bean. Collections were ob-
tained from the Upper Devonian of Michigan, P. Q., the
Middle Devonian of Ontario, New Brunswick, the
Lower Mississippian of Alberta, and the Upper Silurian of Quebec, near Saint John,
N.S. In the course of the collecting operations, the
writer made numerous observations on the location and
geological occurrence of the fossils. The results
of these observations are here presented.

Published by authority of the Board of Trustees

Royal Ontario Museum

Toronto, Canada

NOTES ON THE OCCURRENCE OF FOSSIL FISHES IN THE UPPER DEVONIAN OF MAGUASHA, QUEBEC

By Loris S. Russell
Assistant Director of Vertebrate Palaeontology

During the field season of 1938 the Royal Ontario Museum of Palaeontology sent a collecting expedition to the Palaeozoic fish localities of Gaspé and New Brunswick. The party consisted of the writer and Mrs. Russell, and Mr. L. Sternberg. Collections were obtained from the Upper Devonian of Maguasha, P.Q., the Middle Devonian of Campbellton, New Brunswick, the Lower Mississippian of Albert Mines, New Brunswick, and the Upper Silurian of Nerepis, near Saint John, N.B. In the course of the collecting operations, the writer made numerous observations on the location and geological occurrence of the fossils. The studies made at Maguasha were the most detailed, and yielded the most data, and it seemed desirable that these should be published. However, it was learned from local collectors that similar observations had been made previously by the British palaeontologists, W. Graham-Smith and T.S. Westoll. Accordingly, the writer delayed publication in order that the work of these authors should have the priority it deserved. As no publication on the subject has yet come to the writer's attention, and as it seems improbable that such will appear in the near future, the results of the writer's stratigraphical observations at Maguasha are here offered, in the hope that future collections - and perhaps some of those obtained in the past - can be given a more detailed geological assignment than has been attempted hitherto.

Geographical location. The settlement of Maguasha West is situated on the southwest side of the Gaspé peninsula, on the shores of Escuminac bay. This is part of a body of water that is both the upper end of Chaleur bay and the estuary of Restigouche river. Maguasha West is opposite the lumbering centre of Dalhousie, New Brunswick, known to palaeontologists as the

locality of important Lower Devonian invertebrates. The nearest railway station is Nouvelle (St. Jean l'Evangeliste post office) on the Gaspé line of the Canadian National Railways.

Maguasha West is part of the old Shoolbred seignior, which, in accordance with the custom of New France, was divided into long, narrow lots extending from the water-front inland (pl. 1). As shown by the names on the map, the present owners of the lots include persons of English as well as French descent. Among the French, one may recognize both the Norman and Breton racial characteristics. Almost all of the inhabitants are bilingual. Farming and salmon fishing are the principal industries.

The scenery on Escuminac bay is very impressive. The broad arc of the shore sweeps around from Fleurant point on the west to beyond the Maguasha wharf, where the trend then becomes convex. All along this stretch is a wide gravelly beach, easily traversible except at extreme high tide. From the beach the grey sea-cliffs rise to heights of from 10 to over 100 feet, except in the vicinity of the wharf. It is in these cliffs that the fossils occur. Commencing at the cliff summit the land rises gradually for some distance, forming the main area of farms. Eventually it becomes rugged and wooded. About half-way between Fleurant and Maguasha West the upland almost assumes the character of a mountain, with a bold seaward scarp composed of brick-red outcrops of the Bonaventure formation. This feature was named by John M. Clarke the "Hugh Miller cliffs".

Collectors working at Maguasha can find accommodation at Dalhousie, utilizing the ferry to and from the field. If equipped with an automobile, they can reside in the hotel at Nouvelle or at the inn at Escuminac. The travelling distance from Nouvelle to Maguasha West is about four miles, over a road that is rough in places but usually passable. From Escuminac one drives to Escuminac Flats, thence along the coast to Fleurant and Maguasha West, a total distance of over seven miles. The road is good as far as Fleurant, but the remainder, along the base of the Hugh Miller

cliffs, should not be attempted in wet weather, when the longer route via Nouvelle may be used.

As noted above, the land owners at Maguasha West each possess a portion of the water-front, including the sea-cliffs, where present. As the titles include ownership of the "minerals", it is necessary for the fossil collector to arrange with the owner for excavation rights before beginning work at any site. Unfortunately, some recent collectors here, in their natural impulse towards generosity, have created a false impression of the monetary value of the fossils. The newcomer to Maguasha must therefore be prepared for a certain amount of bargaining. A further complication exists in the rivalry between local collectors, so that if one reaches an agreement with one "camp" he may find it more difficult to negotiate with the other. Much time and trouble will be saved by employing one of the local collectors, of whom Euclide Plourde and Théodore Roy are the most active. From the following notes the prospective collector should be able to decide what places he wishes to work, and make his arrangements accordingly.

Stratigraphy. The geology in the vicinity of Maguasha West has been described by R.W. Ells, John M. Clarke, E. M. Kindle, and F. J. Alcock. It has been shown that the structure here is an anticline, trending somewhat north of east, and having its axis intersecting the shore line in the vicinity of Maguasha wharf. It is because of this condition that the fish-bearing beds occur both west of the wharf, dipping gently north-westward, and south-east of the wharf, dipping strongly south-eastward.

The fish-bearing beds were designated the Escuminac formation by Kindle (1930, p. 84). The description given by that author is as follows. "Grey argillaceous shales and sandy shale interbedded with shaly and thin-bedded sandstone terminating [above] in a 16-foot member of reddish beds. Fossil fish and fine plant fossils." A more extended description is given by Alcock (1935, p. 88), from which we may quote the first paragraph. "The Escuminac formation consists of grey, thin-bedded sandstones, shaly sandstones, and

sandy shales. Shale inter beds between layers of sandstone commonly show ripple-marks. A characteristic feature is the presence of numerous concretions, some of which have a diameter of 3 feet. They are uniformly flat, their diameter in the plane of bedding being much greater than their thickness. Pyrite cubes are common in the beds."

The formation is completely exposed to the west of the wharf, and it is here that the writer compiled his measured section. To the south-east the base of the formation is concealed. Observations on the uppermost beds at various places leads the writer to conclude that the reddish beds mentioned by authors as marking the top of the formation are only normal Escuminac beds that have been stained by impregnated seepage from the overlying Bonaventure conglomerate. This staining may have taken place as early as the time of deposition of the Bonaventure beds, but it does not seem to be an original feature of the uppermost Escuminac. Evidence of erosion of Escuminac beds during deposition of basal Bonaventure sediments is strikingly shown at the contact south-east of the wharf. In the western outcrop it is not so marked.

Columnar section of Escuminac formation on Escuminac bay between Fleurant point and Maguasha wharf

	Feet
Conglomerate, reddish, matrix calcareous; pebbles varicoloured, diameter up to several inches; no clear evidence here of material derived from underlying beds.	
Bonaventure-Escuminac contact.	
Shale, coarsely platy, uniformly reddish maroon in colour.	3
Shale, friable, light greenish grey.	0.8
Shale, as above, with large rounded concretions.	1
Shale, as above, becoming sandy in lower part (fossil zone No. 5).	7
Concretionary bed, platy cleavage, light greenish grey.	1
Shale, light greenish grey to grey, with irregular hard bands	3

Concretionary bed, light greenish grey, with purplish stains	1
Shale, light greenish grey to grey, somewhat sandy in places with irregular hard beds and rounded concretions	10
Shale, fissile, grey	2
Sandstone, fine-grained, grey-buff, with purplish stains; mostly hard, but with soft beds	4
Shale, sandy, grey-buff, with indurated beds	6.5
Sandstone, fine-grained, grey-buff, mostly indurated, platy to massive	2.2
Shale, greenish grey to grey-buff, with some thin beds of sandstone, grey-buff, indurated	20
Sandstone, grey-buff, massive, indurated	1.5
Shale, greenish grey and grey-buff, alternating with beds of sandstone, grey-buff; large indurated masses in places. Note: proportions of shale and sandstone vary laterally	22
Sandstone and shale, as above. Note: sandstone lens at one point expands down 8 feet from top of this member, the sandstone being grey-buff, fine-grained, massive to thinly bedded, with large spheroidal concretions	6
Shale, grey and greenish grey, fissile, with some thin, irregular, indurated beds	13.5
Indurated bed, persistent	0.1
Shale, as above	1.3
Indurated bed, persistent	0.4
Shale, as above (fossil zone No. 4 about 8 to 9 feet from top)	23
Indurated bed, very persistent	0.2-0.5
Shale, as above	0.3
Indurated bed	0.2
Shale, as above	4
Alternating shale, as above, and indurated beds up to 1 foot in thickness	11
Shale, as above, with indurated beds, some of which are persistent (fossil zone No. 3	

occurs 1 to 5 feet above base)	38
Shale, as above, with numerous thin, indurated beds	8
Indurated bed, massive grey	1
Shale, as above, but with no persistent indurated beds	5.7
Sandstone, fine-grained, micaceous, shaly and bedded in upper part, massive below	6.7
Alternating sandstone, fine-grained, massive to thin-bedded, mostly indurated, and shale, grey, fissile, with numerous indurated beds	36
Sandstone, fine-grained, massive, hard, grey-buff	7
Alternating sandstone and shale, as in 36-foot interval above	16.5
Sandstone, fine-grained, massive, indurated	1.4
Shale, grey, fissile, with numerous indurated beds, some very persistent	17
Indurated bed, massive	0.7
Shale, with indurated beds, as above	8.3
Indurated bed, massive	1
Shale, as above, but with no indurated beds	1.4
Indurated bed, stratified to massive	0.8
Shale, as above, with various indurated beds (fossil zone No. 2 from 4 to 6 feet above base	42
Indurated bed, massive to stratified	1.5
Shale, as above, with numerous indurated beds (fossil zone No. 1)	17.5
Sandstone, grey-buff, indurated, massive	1.2
Shale, with some indurated beds	2.8
Sandstone, fine-grained, grey-buff, finely laminated, indurated	1.5
Sandstone, laminated as above, but softer; streaked grey-buff and light maroon; base of formation	1
Escuminac-Fleurant contact	
Conglomerate; pebbles varicoloured, averaging about 2 to 3 inches in diameter, but some exceeding 1 foot; matrix of grey sandstone; lenses of sandstone present; distinct bedding; tops of uppermost pebbles inclosed by	

basal Escuminac sediments.

Total thickness of Escuminac formation, about 378 feet.

The thickness determined by the writer agrees very closely with the figure (370 feet) given by Kindle, indicating that the two measurements were obtained in about the same manner. It is unlikely that a non-marine formation, especially one with an erosional upper limit, would retain a uniform thickness over any great distance.

Fossil zones. The term zone is employed here because of the rather indefinite vertical range of the fossils. There seems to be an association between the indurated layers and the fossils, although there are many such layers that are unfossiliferous. The normal collecting method consists of excavating along the zone and removing slabs as large as possible of the shale or indurated rock. Common practice is to crack such slabs through the middle and examine the fresh edges for signs of bone. Plates of Bothriolepis appear in this manner as dark, angulate lines, while the "scale-fishes", Eusthenopteron and Scaumenacia, show as fine, wavy or speckled lines, with a peculiar crystalline texture. A little experience permits the collector to recognize the presence of a fossil without resorting to such drastic methods. Gentle bulges on the surface of the slab, usually with a glossy appearance, almost certainly indicate the presence of a fossil beneath. If the slab in question is of moderate to small size, and subcircular in outline (the rounded concretions of authors) it will probably be found to contain remains of Bothriolepis. Often a small portion of the plates projects through the surface. The larger, more angular pieces usually carry Eusthenopteron.

Owing to the dip of the strata, most of the fossil zones are limited in outcrop to certain portions of the cliffs. In the following paragraphs this distribution is discussed, with some hints as to the best location for working. The commoner types of fossils occurring in each zone are indicated.

Fossil Zone No. 1

This occurs near the base of the formation, as indicated in the above section. Its principal outcrop is in the low sea-cliff on the property of Emile Roy, but it has also been reached by excavations on the beach in front of Antoine Plourde's lot. The fauna includes Bothriolepis, Scaumenacia, and very fine acanthodians.

Fossil Zone No. 2

Proceeding upwards in the formation, or westward along the beach, the next zone is encountered in the low cliff fronting the lot of Antoine Plourde, just east of the mouth of a small creek. The commonest fossils here are acanthodians, but they seem to be uniformly smaller than those of zone No. 1. It is here also that the problematical remains of Scaumenella mesacanthi Graham-Smith occur, known to the local collectors as "pin-fish".

Fossil Zone No. 3

This, according to the writer's observations, is the richest zone in the formation. It rises from the beach near the eastern edge of Alexis Roy's property, and can be traced to the east diagonally up the cliff fronting the lot owned by George Hayes. A very promising spot occurs at the highest outcrop of the zone, just west of where it disappears under the drift, but this is a little awkward to reach. The abundant fauna includes fine specimens of Bothriolepis, Eusthenopteron, Scaumenacia, and occasional acanthodians. A few plant remains also occur here.

Fossil Zone No. 4

This outcrops near the western edge of Alexis Roy's property, and the fossils occur high on the cliff. The writer obtained specimens of Bothriolepis and Scaumenacia from here, but no extensive collection

was made.

Fossil Zone No. 5

This occurs near the top of the formation. The exact geographical location was not determined, but it is probably in lot 200, owned by Emmanuel Landry. At this point the beds appear to be horizontal, due to the coincidence of the plane of outcrop with the strike. The zone persists for at least several hundred feet along the cliff. Specimens of Bothriolepis were obtained here, and fine examples of Eusthenopteron are said to occur. The most abundant fossils are beautiful plant fronds, the commonest being those of the genus Archaeopteris. Owing to the high position on the cliffs, this zone is a little difficult to work.

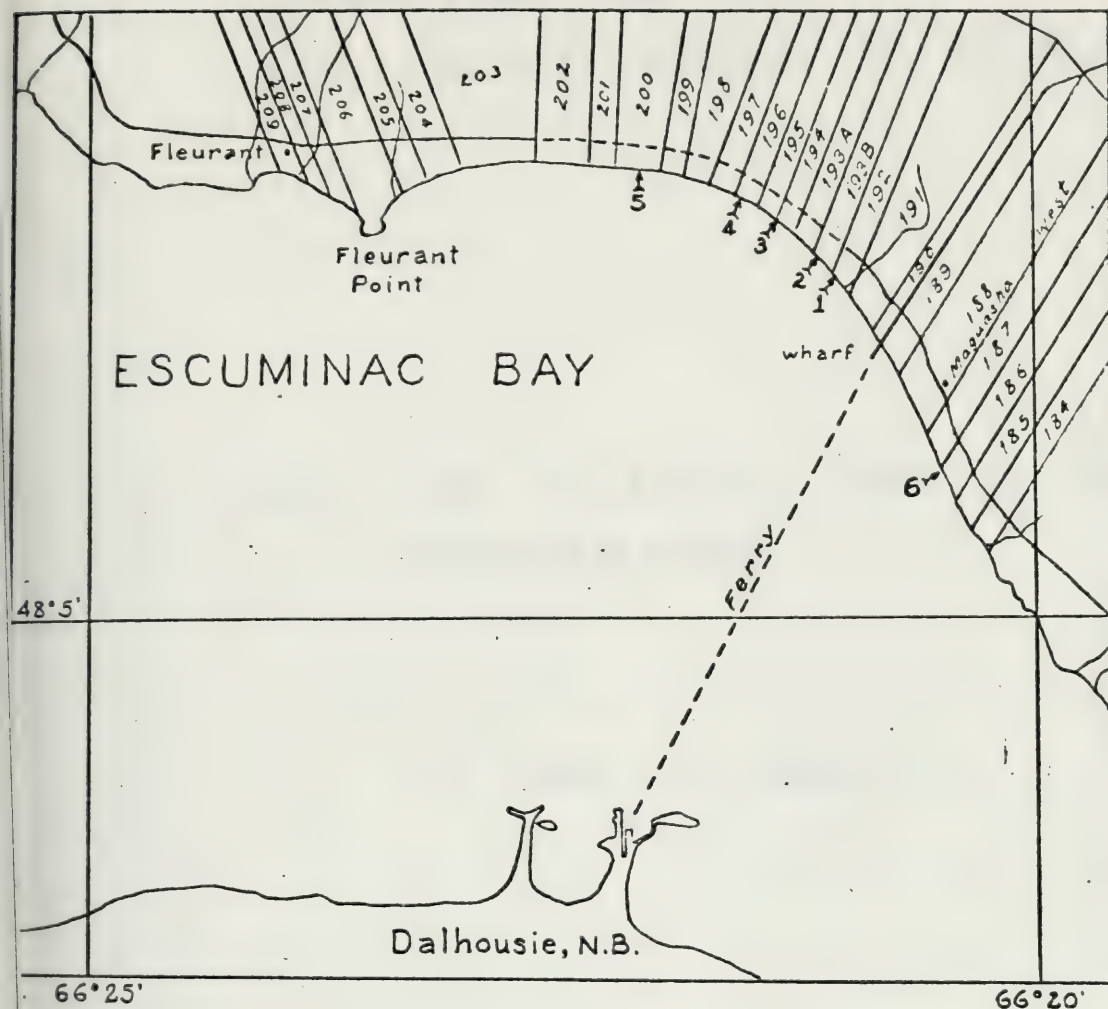
Fossil Zone No. 6

This is the only zone examined by the writer in the outcrops south-east of the wharf. It rises from the beach on lot 186, owned by Theodore Roy, and extends diagonally upward across the cliff on lot 187, the property of George Hayes. It is much more easily accessible on Roy's lot than on Hayes's. The exact stratigraphical position was not determined, but it appears to be approximately the same as that of zone No. 3, west of the wharf. The fauna includes Eusthenopteron, Scaumenacia, Cheirolepis canadensis, and Bothriolepis.

References

- Alcock, F. J. (1935): Geology of Chaleur Bay region; Geol. Surv., Canada, Memoir 183.
- Clarke, J.M. (1911): Notes on the Geology of the Gulf of St. Lawrence III Stratigraphy of the Devonian fish beds at Migouasha, Province of Quebec; New York State Museum, Bull. 149, pp. 128-130, pls. 9-11.
- Clarke, J.M. (1913): Dalhousie and the Gaspé peninsula - Scaumenac bay; Twelfth Inter. Geol. Cong. Guide Book No. 1, pt. 1, pp. 113-115, 2 pls.
- Ells, R. W. (1881): Report on the geology of northern New Brunswick; Geol. Surv., Canada, Rept. Prog. 1879-80, pt. D.
- Ells, R. W. (1883): Report on the geology of northern and eastern New Brunswick; Geol. Surv., Canada, Rept. Prog. 1880-81-82, pt. D.
- Kindle, E. M. (1930): Stratigraphic relations of the Upper Devonian beds and the Bonaventure conglomerate, at Escuminac bay, Quebec; Geol. Surv., Canada, Summ. Rept. 1928, pt. C. pp. 83-89, 1 pl.

PLATE I



SCALE: 1 INCH = 1 MILE

ot 184, George Connors	Lot 197, Ludger Roy
ot 185, " "	Lot 198, vacant
ot 186, Théodore Roy	Lot 199, " "
ot 187, George Hayes	Lot 200, Emmanuel Landry
ot 188, Michaël Norton	Lot 201, vacant
ot 189, James Norton	Lot 202, David Wafer
ot 190, Henry and William Wafer	Lot 203, Clarence Edwards
ot 191, L. T. Landry	Lot 204, Harry Wafer
ot 192, Emile Roy	Lot 205, Thomas Bailey
ot 193A, Antoine Plourde	Lot 206, David Wafer
ot 194, Frederick Letourneau	Lot 207, " "
ot 195, George Hayes	Lot 208, Alfred Grey
ot 196, Alexis Roy	Lot 209, Wallace Dickey
ot 196, " "	

Plate I. Map of the vicinity of Maguasha West. Quebec, showing ownership of lots, and location of principal fossil beds; based on Geological Survey of Canada, Map 286A, and information supplied by the Quebec Bureau of Mines.



